Demonstration Hand-outs for Students

Topic: Surface Tension
Demonstration: Boat Drive
Materials:

- Paper or overhead transparency plastic
- Scissors
- Water
- Tray
- Eyedropper
- Dish detergent.

Procedure:

1. Cut a thick arrow out of paper or a plastic overhead sheet.
2. Cut a keyhole shape out of the tail of the arrow, with the circle of the keyhole closest to the tip of the arrow.
3. This is the "boat".
4. Place it on the surface of the water in the tray.
5. Using an eyedropper, place a single drop of detergent in the circle of the keyhole shape.
6. Watch what happens to the boat.

Analysis:

-What made the boat move?
-Was the boat pulled or pushed across the surface. Explain.
-What did the detergent do to the surface of the water?

Topic: Surface Tension
Demonstration: Quick Pepper
Materials:

- Peppercorn
- Ground Pepper
- Water
- Petri dish
- Eyedropper
- Dish detergent
- Beaker

Procedure:

1. Sprinkle some ground pepper on the surface of the water in the petri dish.
2. Ask the class if the pepper is truly floating or just sitting on the surface.
3. To find out, drop the peppercorn in a beaker of water.
4. Next use the eyedropper to place a single drop of detergent in the center of the dish.
5. Observe what happens.
6. Next, add a little more soap to the dish and watch what happens to the pepper.

Analysis:

-Did the peppercorn float on the water? The groundpepper flakes?

-What did the detergent do to the surface of the water.
-Why did the pepper sink at the end?

Topic: Surface Tension
Demonstration: Pennies
Materials: 2 drinking glasses, water, pennies, detergent
Procedure:

1. Fill each glass exactly to the brim with water.
2. Before the demonstration starts, put a drop or two of detergent in one of the glasses.
3. Ask the class how many pennies they think can be added to a glass before the water spills over.
4. Start with the pure water and have the class count as pennies are dropped in.
5. Next ask a student from the class to come up and drop pennies into the other glass (the one that has soap in it).
6. Again, have the class count while the pennies go into the glass.
7. Observe what happens.

Analysis:
-How many pennies were put in each glass?
-Why did less pennies fit into one of the glasses?
-What does soap do to the molecules at the surface of the water?

Topic: Surface Tension
Demonstration: Needle
Materials:

- Beaker
- Water
- Needle
- Wax (optional)
- Paper clip (optional)

Procedure:

1. Fill the beaker with water.
2. Drop the needle into the water vertically.
3. Watch the needle go to the bottom.
4. Fish the needle out and dry it off.
5. Gently lay the needle flat on the surface of the water.
6. Sometimes it helps to use a bent paper clip to gently place the needle on the surface.
7. Also rubbing wax on the needle can be helpful too.

Analysis:
-Why did the needle sink when placed in the water vertically?
-Why did the needle sit on the surface when laid flat?
-Explain the role of the wax and the paper clip (if used).

Topic: Capillary Action
Demonstration: Colorful Carnation

Materials:

- White carnation
- Red food coloring
- Blue food coloring
- Two small beakers
- Water
- Scalpel or sharp knife

Procedure:

1. Fill each beaker half full of water.
2. Stir 3-4 drops of red food coloring in one beaker.
3. Stir 3-4 drops of blue food coloring in the second beaker.
4. Cut the stem of a white carnation so that it is about 10 cm long.
5. Carefully split the stem in half, cutting up towards the flower.
6. Place one half of the stem in the beaker with red food coloring and the other half of the stem in the beaker with blue food coloring.
7. Leave it over night.

Note: Use caution when cutting with the knife or scalpel.

Analysis:

-Why did the carnation change colors?
-Would it be possible to make a carnation turn three or four colors? How?
-If the water is not colored, does it move up the same way? How do you know?

Topic: Capillary Action

Demonstration: Towel Climb

Materials:

- Two identical buckets
- Towel
- Water

Procedure:

1. Fill one bucket with water and leave the other one empty.
2. Put the two buckets side by side on a table or on the floor.
3. Place a towel in the wet bucket and drape one corner of the towel in the dry bucket.
4. Leave the set up over night.

Note: This set-up will work faster if a wet towel is used.

Analysis:

-Explain what happened.
-Is it possible for all the water to move to the second bucket? How?
-Will the water stop transferring itself at any point?

Topic: Capillary Action

Demonstration: Capillary Tubes

Materials:

- Set of capillary tubes
- Tray or other small container
- Food coloring

- Water

Procedure:

1. Pour some colored water in the tray.
2. Gently dip each capillary tube in the water and watch the color rise up the tubes.

Analysis:

-Why does the water move up the tubes?
-Why does the water rise to different heights when the tubes are different diameters?
-How does this demonstration relate to plants?

Topic: Capillary Action

Demonstration: Creative Water Transfer

Materials:

- Two beakers
- Water
- Tape
- Cotton string (about 30 cm)

Procedure:

1. Use tape to divide the demonstration area into two sections.
2. Place a beaker on each side of the tape.
3. Fill one beaker with water and leave the other one empty.
4. Challenge the class to suggest ways to get the water from one beaker to the other without letting either beaker cross the line of tape.
5. After listening to suggestions, hold a piece of wet cotton string inside the beaker full of water and gently pour the water along the string to the empty beaker.

Analysis:

-Why did the water move along the string?
-Why is it best to use a wet string?
-What could be used to replace the string? the water?